# Dimensional Derivation Of Plank's Constant; New Definition For Relative Mass, Gravity & Photons:

**Bhasanpal Thiru**

**ORCID: 0000-0003-4896-8427**

**Email: sbsp181107@gmail.com**

**Basic Fundamental Constants:**

Mass of electron (Me) = $9.1094 \times 10^{-31}$ ( M )

Radius of electron (Re) = $2.8179 \times 10^{-15}$ ( L )

> Me × Re = $2.5669 \times 10^{-45}$ ( M L )

Mass of proton (Mp) = $1.6726 \times 10^{-27}$ ( M )

Radius of proton (Rp) = $0.8414 \times 10^{-15}$ ( L )

> Mp × Rp = $1.4073 \times 10^{-42}$ ( M L )

   Since these two are the mass radius ( M L ) of the smallest stablest massive fundamental particles, the geometrical mean of those will form the basis for all other massive particles.

> Geometrical mean ( M L ) = √( Me × Re × Mp × Rp ) = $6.0103 \times 10^{-44}$ ( M L )

Speed of light in vaccum (c) = 299792458 ( L / T )

   Fine-structure constant (@) = 1/137 (It is used as a scaling factor for conversion from sub-atomic level to the higher macroscopic observable level on repeated multiplication)

**Example:**

   Energy between electron & proton in hydrogen atom (Eep) = $ke^2/Re$ (Re - Radius of electron in the hydrogen atom = $5.3 \times 10^{-11}$ m)

   Energy of the electron in the 1st orbit of hydrogen atom (Eo) = hc/(lambda) {here, lambda = $2\pi Re$}

   Energy of the electron (Ee) = Me c²

Here, the scaling can be done as;

> $ke^2/Re$ = @ hc/$2\pi Re$ = @² Me c² (you can check by substituting the values)

4 × Fine-structure constant (4@) = 4/137

Plank's Constant (h) = 6.6261×10^-34 ( M L² / T ) = ( M L ) c / 4 @ { let it be as it, from below we can determine the accurate mass radius value with it }

Elementary charge (e) = 1.6022×10^-19 ( I T )

Epsilon not (E°) = 8.8542×10^-12 ( T⁴ I² / M¹ L³ )

Mu not (μ°) = 1.2566×10^-6 ( M L / T² I² )

Derivations of μ°, E° & h from the above values as follows;

As we know that; ( from, https://en.m.wikipedia.org/wiki/List_of_physical_constants )

> μ° = 4 π @ h' / e² c = 2 @ h / e² c

> μ° e² = 2 @ ( M L ) c / 4 @ c { since, h = ( M L ) c / 4 @ }

> 2 μ° e² = ( M L ) = 6.4515×10^-44 M L { which is comparable to the value as calculated above with mass & radius of both electron & proton }

Thus, confirm value of mass radius as: 6.4515×10^-44 ( M L )

This same can be use in the E° also, which is a vice versa.

Now, coming to the actual interesting topics of this paper;

**MASS:**

Actually upto now, according to theory of relativity, we have been thinking that if an object moves fast its mass increases relatively, which is actually not quite explanatory since we can't measure objects at the velocity comparable to velocity of light.

But here's the catch, according to relativity length contracts, time dilates, but mass increases, & according to standard conservation of energy, total energy = potential energy + kinetic energy.

Now, coming to my explanation, length & time will act as the same, but mass decreases on increase in velocity, as accelerating charges emits radiation & its mass decreases by emitting them: It can be explained by the classical & practical example i.e., binding energy of an atom: the combined mass of electron & proton separately is much greater than the mass of a hydrogen atom, which when an electron from an infinite distance combines with a proton by emitting radiation and forming hydrogen atom, in the similar fashion proton also losses its share of energy due to motion; thus, this same circumstances imitates a cyclotron where we give of external field to accelerate here it is the field of proton, but we can't weigh the cyclotron system to detect the mass change, but here it is possible, just measure an hydrogen atom to disprove that mass does not increase with increase in velocity, rather it will decrease.

Thus, the mass refers to the quantity of potential energy or innate content any object in any frame of reference with respect to a frame of reference which is considered to as rest frame, for example, mass of electron in our present frame i.e., surface of the earth is measured as $9.1094 \times 10^{-31}$ kg, which when enters the cyclotron or along with proton forming hydrogen atom, we can say that its mass decreases, but when you are travelling along with the electron at that speed, if you measure the mass of electron at that frame of reference, you will measure it as the same $9.1094 \times 10^{-31}$ kg; as you will experience everything as a normal phenomenon, but when viewed from the earth's surface i.e., rest frame, you will observe the increased velocity, and their reduced radius of the electron in the hydrogen atom & the cyclotron. But, in that electron frame, the distance & velocity will be viewed as a normal one, since the length contraction & time dilation can be detected by us, but for them the radius & time will stays normal as usual for them.

And, so the total potential energy or mass of the universe = the potential energy of all the matter + kinetic energy of all matter {or the emitted radiational energy due to motion calculated by Relative Mass (Mr) = Rest Mass (M°) × $\sqrt{(1-(v^2/c^2))}$}. That is, if an object moves its potential energy is converted to its kinetic energy by loosing of the energy in the form of radiation.

**GRAVITY:**

This can be defined as the, potential of an object or mass to regain its lost energy due to radiation because of the current state of motion with respect to the CMB (cosmic microvave background), in order to regain its potential energy & to move to the rest state.

Since, for our universe, the CMB is the rest frame of reference, and with respect to it all the stars & galaxies are moving, thus they have the gravitational force, thus the matter we observe now & measure are all the relative mass, length & time, with respect to the CMB; so with the relativistic equations we can calculate the change in mass with respect to the CMB, which is defined as the gravity, as per this concept.

Most of us are thinking about where the anti-matters went, it will be on the opposite pole of the universe, since all the matter produces along with its counter part, the counter part will be in the counter pole of the universe, the form their own system, since due to the accelerated expansion, it's nearly impossible for the matter galaxy to collide with the anti-matter one.

Now coming to the explanation of the fore-mentioned concept of gravity;

**Universe's Data:**

Critical density (d) = $9.9 \times 10^{-27}$ kg / m³

Mass of Observable matter (Mo) = $1.5 \times 10^{53}$ kg

% of Observable matter = 4.9 % ( According to New Cosmic Recipe )

Mass of Total Universal matter (Mt) = $3.0612 \times 10^{54}$ kg

Volume of the universe (Vt) = $3.0921 \times 10^{80}$ m³

Radius of the universe (Rt) = $4.1949 \times 10^{26}$ m

> Rt / Mt = $1.3703 \times 10^{-28}$ m/kg = $1.4 \times 10^{-28}$ m/kg

- Speed of light in vaccum (c) = 299792458 m/s

- Fine-structure constant (@) = 1/137

- 4 × Fine-structure constant (4@) = 4/137

- Universal gravitational constant (G) = $6.6743 \times 10^{-11}$ m³ / kg s²

**Sun's Data:**

Mass of sun (Ms) = $1.9884 \times 10^{30}$ kg

Radius of sun (Rs) = 6.957×10^8 m

Velocity of sun with respect to CMB (cosmic microwave background) (Vs) = 3.69×10^5 m/s

Surface gravity of sun (Gs) = 274 m/s²

According to classical physics;

> Gs = G Ms / Rs²

But, according to my concept;

> Gs = ( Rt / Mt ) × ( 1 / 4 @⁴ ) × { ( Ms° - Msr ) c² / 4 π Rs² }

[ Ms° - Msr = {[1 / √(1-Vs²/c²)] - 1} Msr (Msr - present calculated mass of the sun) ]

= 7.5749×10^-7 Msr,,

> {(1.4×10^-28)×(137×137×137×34.25)×(7.5749×10^−7×1.9884×10^30)×(299792458)^2}÷{4×π×(6.957×10^8)^2} = 274.4217 m/s²

G = 6.6797×10^-11 m³ / kg s² (when calculating from the above expression excluding the Mass of sun & (Radius of sun)², it is comparable to the Universal gravitational constant)

Which is on comparable to the Surface gravity of the sun, that is fore-mentioned. In this manner, we can calculate the surface gravity of any celestial body in the universe, if we know its velocity with respect to the CMB.

Thus, gravity can be defined as the potential energy/mass lost due to the relative motion of a matter with respect to the CMB.

Thus, black hole is not a massive body, it's just a lean body starved of potential energy, which it seeks from the surroundings in the form of matter or even not leaving the radiational energy to escape, it is an object of matter whose state is greater than photons & lesser than sub-atomic particles with much less potential energy; thus in theory we can say that these black hole will leads to the unification of all the matters in the end stage of the universe & create a very massive body, which will inturn collapse on itself to create a next big bang, in which only a residual matter of very small % will go unstable forming the visible (baryonic) matter in the universe, the remaining stable mass scattered throughout the universe (dark matter), with the collapse energy pushing everything towards outward (dark energy), which in the end due to formation of consecutive blackholes & their unification will leads to the inward pull, then to the formation of the all matter unification in a single place, then subsequent big bang can be resulted due to the any reasons, asymmetrical end mass formation or imbalance at the end force or many others.

**PHOTONS:**

Here we are going to see about the quantifying of a photon. Have you ever wondered how electron positron pair formed in the cosmic ray showers, from the high energy gamma radiations. For this I have formulated a theory, as such;
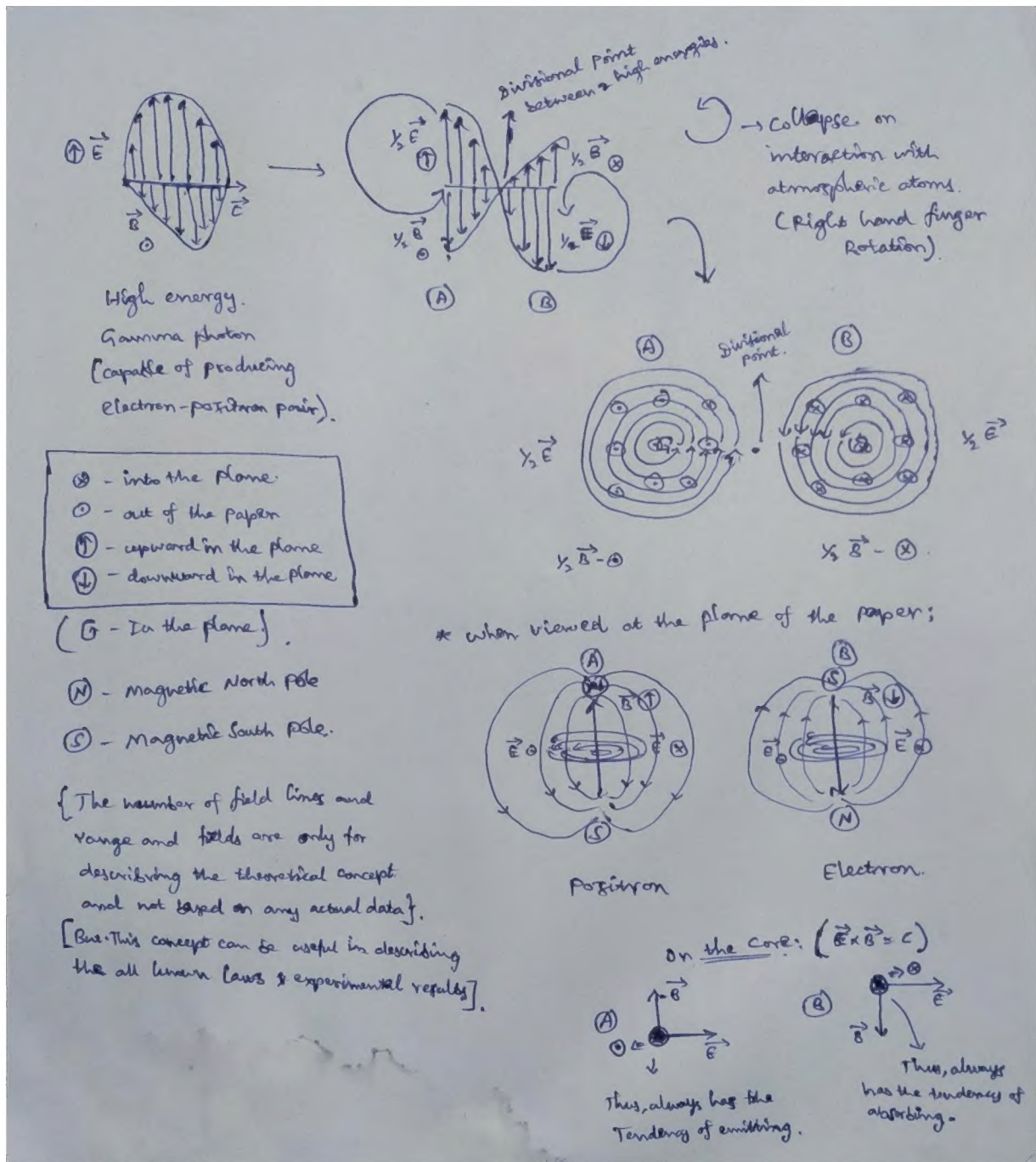
A photon is defined as the combined electric & magnetic component of either the trough or the crest of the wave, & not the complete cycle of the wave containing the both, and I their by quantize the photons. This will be responsible for the particle nature of photons. Its electromagnetic wave components of electric & magnetic will be responsible for the wave component of the photon.

There by a photon, comprises of only the half components of a wave like, half of wave length, its energy components will be divided to the electric & magnetic axis, thus the electric crest of em wave will give rise to the electric trough of em wave, and it will inturn give rise to the electric crest along the direction of the wave. This will the same for the magnetic component also.

Now, coming to the critical concept; when a photon is half way through, (i.e., imagine a em wave with half electric trough & half electric crest & their corresponding magnetic components) with the energy greater than 2 times the mass of an electron & hitting the atoms in the atmosphere in that state, will leads to instability and leads to the formation of the electron-positron pair from it. As we know that E × B = c (velocity of light in vaccum); in the fore-mentioned state, i.e., when the photon is with half electric trough & half electric crest along with its corresponding magnetic component, when hit with a atomic field at the junctional point i.e., between the crest & trough, it will get unstable, at that high energy, the electric crest & trough will collapse within itself and form a closed circular circuit, such that the electric field will form the equator & the corresponding magnetic field will form the magnetic poles along the direction of their action; happens as the peak of both crest & trough will collapse onto itself and forming the centre of the particles followed by the weak fields towards the border of the particle.

Thus, this will give rise to the formation of particles, with right handed rule, fingers folding points the electric field flow & the magnetic field comes out of the pointed thumb, it denotes the north pole, thus the particle refers to the positron (it occurs in the electric crest area); if the finger folding points the electric field flow & the magnetic field flow into the pointing thumb, it denotes the south pole, thus the particle refers to the electron (it occurs in the electric trough area); this will be understandable if the direction of the em wave is towards you, and sketching the electric & magnetic components accordingly.

The fore-mentioned concepts are depicted in the diagrams as follows;



High energy.
Gamma photon
(capable of producing
electron-positron pair).

⊗ - into the plane.
⊙ - out of the paper
⬆ - upward in the plane
⬇ - downward in the plane

( ⊙ - In the plane).

Ⓝ - magnetic North Pole

Ⓢ - Magnetic South Pole.

{ The number of field lines and range and fields are only for describing the theoretical concept and not based on any actual data}.
[ But. This concept can be useful in describing the all linear laws & experimental results].

$\frac{1}{2}\vec{E}$

$\frac{1}{2}\vec{B}$ - ⊙

$\frac{1}{2}\vec{E}$

$\frac{1}{2}\vec{B}$ - ⊗.

* when viewed at the plane of the paper;

Positron

Electron.

On the core: $(\vec{E} \times \vec{B} = c)$

Thus, always has the Tendency of emitting.

Thus, always has the tendency of absorbing.

The formed particles will maintain their integrity by the alternative production of electric & magnetic fields within them, i.e., the electric component will gets destroyed by giving rise to the magnetic component, simultaneously the magnetic component will gets destroyed by giving rise to

electric component as in the moving em wave, (but this process will be in a linear fashion in the positive charge where the magnetic & electric components will create the pre-existing electric & magnetic components respectively, which will be differ in case of negative charge where the electric component will create a reverse of pre-existing magnetic component & magnetic will create the reverse of pre-existing electric component, which will results in the change in magnetic polarity of the negative charge after each cycle, but the electrical negative property will be the same or conserved in all cycles), thus mutually maintaining the integrity of the particle & exhibiting the electric & magnetic properties of the particles as nature of the charge & poles; but this structure will be complicated in the protons & neutrons as there are quarks within them with partial charge, which can be explained be the same structures as the electron & positron, which as a whole forming a single particle proton.

Thus this structure can be helpful in explaining the absorption & emission of the em wave by the charged particles, take electron for example in an atom, when it absorbs a photon, it moves from a high field state inner orbit to a low field state outer orbit, thus consuming the equatorial electric & polar magnetic components of the photon within itself, and get stabilized, if it in order to get into the atoms inner orbit to maintain the ionic property or neutralize it, it releases the excess electric & magnetic components to get into the inner orbits, where it will have to be squeezed to fit in, since in all the states whether in the inner orbit or in the outer orbit the electric & magnetic components will maintain their appropriate ratio, this indicates the constant change nature of the electron inspite of change in the mass through absorption & emission of photons. Which is not the same in case of quarks, where there will be imbalance exists between the electric & magnetic components within itself & resulting in partial charges & along with two other quarks with instability forms a stable particle proton & neutron.

Thus, in this way, this theory explains the particle nature of the em wave thus, describing the simultaneous existence of wave-particle duality of the photons, the wave nature of the electrons in the double slit experiment can be explained by; as the slits are very close to each other & the launched electron will oscillates along the course of its travel, this oscillation election will results in the oscillating electromagnetic field through the double slits even before its passing through, which will forms a interference pattern like that of a light passing through, if the electron is short through in a velocity, even its own field will influence it, by crossing through the other slit, will results in the same interference pattern as the light.

Thus, in the end I'm convinced to say that the photon is just a bits of em wave, which mimics the particle nature and electron is a particle formed with em wave at its core, which mimics the wave nature.


Atlast quantum entanglement is a predictable phenomenon, when 2 electrons made contact with each other they will align each other as in the pauli exclusion principle, they will get entangled, when separated even to the infinite distance due to the conservation of the momentum their rotation, axis/poles will be directly opposite to each other, considering without any external influence, which is a realistic particle behaviour rather than a non-realistic one.